C·R·E·S®
CENTER FOR REPRODUCTION OF ENDANGERED SPECIES

REPORT

WINTER 1992/1993

The Lion-tails of St. Catherine's Island

We are often asked about the ability of captive-born animals to survive in the wild. Release programs can be successful—if there is preparation beforehand. This is the story of a troop of lion-tailed macaques maintained by the Zoological Society of New York. Observations of this troop and the one at the San Diego Wild Animal Park will be compared and evaluated by CRES Animal Behavior Specialist Helena Fitch-Snyder.

> **"This is a critical time for many of the world's primate species . . ."**

Off the coast of southern Georgia lies St. Catherine's Island, some 10 by 1 to 3 miles in size, which is now home to 8 free-ranging lion-tailed macaques, an endangered primate species native to the wet forests of southern India. The island is ideal habitat for these arboreal primates and a good transitional home for the animals, which will one day be released into the wild. The troop of 6 males and 2 females, each fitted with a radio collar, was placed at the Wildlife Survival Center by the New York Zoological Society in July 1991. A comparable troop is maintained off exhibit (begun in July 1989) at the San Diego Wild Animal Park by the Zoological Society of San Diego, where 5 males and 9 females live in a 3/4-acre kraal that includes trees, boulders, and a pool. Both programs are run in cooperation with the Lion-tailed Macaque Species Survival Plan (SSP), with the goal of future reintroduction into the wild.

During July and August 1992, I had the opportunity to spend four weeks studying the behavior of the free-ranging troop of lion-tailed macaques on St. Catherine's Island, and it led to a valuable exchange of ideas between the two facilities. My studies centered on the social interactions of the 4 oldest—and presumably highest-ranking— males in the group. This behavioral data will be compared with 4 males of comparable age and social status from the Wild Animal Park's troop.

The foraging and ranging behavior of the troop was observed in its free-ranging environment on a subtropical island and the question was

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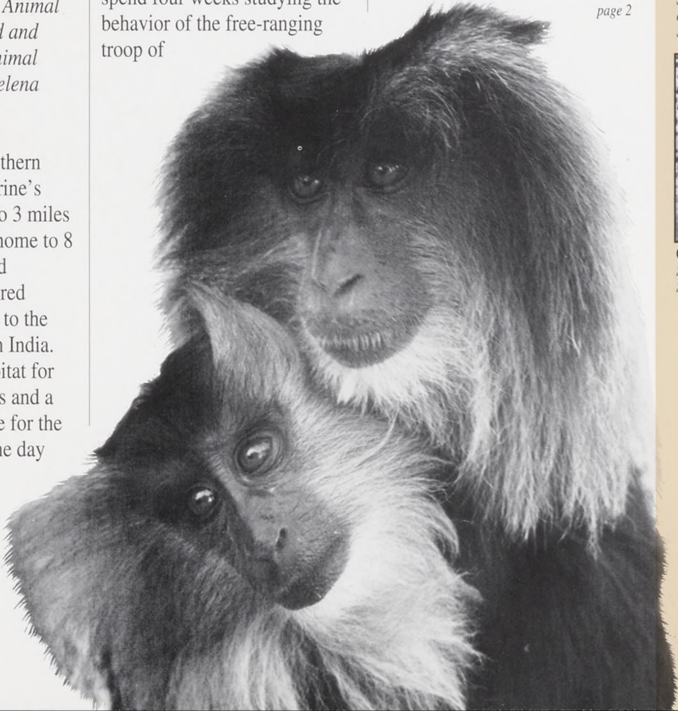

CRES is operated by the Zoological Society of San Diego.

Helena Fitch-Snyder
Animal Behavior Specialist/Supervisor. See page 1-2.

Sumatran Rhino
Sumatran rhino reproduction is the focus of Dr. Lee Hagey's research. See page 4.

Cheetah Communication
Scent marking as a form of communication. See back page.

Hang Ten International Launches "Kids for Animals" Line for CRES

Children's animal favorites—primates and reptiles—are featured in "Kids for Animals." This new boyswear clothing collection by Hang Ten International will benefit the work underway at CRES. The animal-themed collection that includes chimpanzees, orangutans, and iguanas is being launched with a group of sets and coordinated separates for toddler boys (sizes 2T to 4T) and young boys (sizes 4 to 7). "Kids for Animals" will be in better department and specialty retail stores, as well as in children's stores, by late fall.

HELENA FITCH-SNYDER

About the Author

Helena Fitch-Snyder came to the Zoological Society of San Diego in 1981 as a research assistant for the CRES cheetah breeding program at the Wild Animal Park. Since then, she has become the animal behavior specialist/supervisor at CRES and has worked with primates for more than a decade, overseeing projects at both the San Diego Zoo and the San Diego Wild Animal Park. Helena's primary research has covered many aspects of behavior and reproduction of the lion-tailed macaque and the slow and pygmy lorises. She is currently the studbook keeper for the Asian prosimians and co-chair for the Prosimian Taxon Advisory Group, as well as editor for the cheetah and lion-tailed macaque newsletters. Helena is a member of the American Society of Primatologists and the Captive Breeding Specialist Group (CBSG).

The Lion-tails of St. Catherine's Island

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asked, how will this approximate the troop's food-gathering activities when released into the wild. Observations of the animals were done on a daily basis, and both social and ranging information were collected, as well as data on foraging behavior and identification and location of food items. All of these data are necessary before we can make wild management decisions.

The St. Catherine's Island troop has unlimited access to the entire island, but they tend to spend most of their time within 100 yards of the holding area. The macaques tended to travel in the early evenings when they forage for food in the nearby forest, on their way to their sleeping trees. They are trained to go inside the holding pens daily to acquire food, which consists of a nutritionally complete diet of biscuits, fruits, and vegetables. (This behavior is reinforced to allow a means of simple capture if veterinary procedures are needed).

The troop is also being encouraged to forage for food and to range farther from the holding pens. This will be easier as natural food supplies such as wild grapes and acorns become more plentiful. The animals were fasted one day and their response to this change of routine was documented. At first, the group waited patiently at the site; but several hours after their usual feeding time, they actively began to search for food in the forest, up to 300 yards away. They chose food items such as ants, beetles, termites, skink lizards, and frogs. Plant items included mushrooms, bark fungus, palmetto fronds, holly, unripe muscadine grapes, bay leaves, pinecone seeds, and grasses. After several hours of continuous foraging, the troop settled down for the night in sleeping trees.

One interesting observation involved the use of tools. When collecting drinking water from knotholes in large trees, a macaque would dip its entire hand into the water hole and lick moisture off the back of its hand. Even more fascinating were observations of actual tool use to collect water from knotholes. One lion-tailed macaque was seen grasping a handful of leaves, repeatedly immersing them into the cavity and licking off the dripping water. The leaves were left in the hole when the macaque departed, and a second lion-tail was also seen using the leaves as a sponge to absorb water for drinking. This type of tool use has been recorded with higher primates but has not been documented in macaques. And, since the fresh water ponds on the island are commonly inhabited by alligators, it is reassuring to discover that the macaques are able to find alternate water sources!

Plans are being made for Indian officials to visit both the St. Catherine's Island and the San Diego Wild Animal Park facilities and observe the management techniques of these projects in 1993. The release of these animals into wild habitat in India is also being considered, and a symposium in October 1993 in southern India will develop these strategies.

This is a critical time for many of the world's primate species, which are so threatened by habitat destruction and expanding human populations. We hope that the success of these lion-tailed macaque programs will provide models for other endangered species' reintroduction programs.

INSIDE C·R·E·S

CENTER FOR REPRODUCTION OF ENDANGERED SPECIES

Reproductive Physiology

Zoos now know that self-sustaining captive populations of exotic animals may hold the only hope for species conservation. As a result, interest in germplasm (sperm and ova) storage has increased dramatically. As part of the San Diego Zoo's long-range conservation programs, a germplasm repository was established at CRES in 1980 to augment the Frozen Zoo (the Society's cell and sperm bank). To date, nearly 2,100 semen, oocyte, and embryo collections have been performed and the samples have been frozen. The CRES repository is a dynamic collection with samples continuously being added and thawed for basic research on sperm cryopreservation, oocyte freezing, *in vitro* maturation, and embryo preservation. The repository currently holds more than 4,100 samples from 425 individual animals representing 149 species. Due to the frequent turnover of samples in our germplasm inventory, an easily updated computer tracking system was designed to rapidly access each of the 4,100 current locations in our three liquid nitrogen storage tanks. Our inventory management system has been used as an example for other zoos designing computer tracking systems.

> ***"Zoos now know that self-sustaining captive populations of exotic animals may hold the only hope for species conservation."***

Genetics

A study testing new technology for investigating genetic variability in wild gorillas is being conducted by Drs. Oliver Ryder and Karen Garner, with funding from the **Morris Animal Foundation**. Information about genetic differences within and between populations can be obtained from shed hairs collected from the gorillas' sleeping nests. Tiny amounts of DNA from the hair follicles are increased in quantity using a method known as the polymerase chain reaction (PCR). This technique has been used to confirm that two presently isolated wild populations of mountain gorillas are of the same genetic stock. DNA from hairs can also be used to determine family relationships in gorilla groups. Genetic markers developed for use in human medical research have been successful in identifying lineages in gorillas. Information about the paternity of infants will be extremely useful in helping to understand social relationships in gorilla groups with more than one adult male.

Endocrinology

CRES Endocrinologist Dr. Valentine Lance will be applying his hormonal technique—which has had a 100 percent success rate in three turtle species and hatchling alligators—to a program for sexing immature gharials in 1993. The Indian gharial, an unusual, slender-snouted crocodilian found only on the Indian subcontinent, was thought to be close to extinction a few years ago. A "head start" program involving captive breeding was initiated by the Indian government and the Madras Crocodile Bank, and it has resulted in hundreds of hatchlings that have been returned to the wild. One of the problems with this program is that the sex of young gharials cannot be determined externally. The sex of gharial hatchlings is probably also determined by egg-incubation temperature, as with many other reptiles. While in India, Dr. Lance will train an Indian student in the hormonal technique and in testing the technique on gharial hatchlings from eggs incubated at a range of temperatures expected to produce males and females. Obviously, it is vitally important to know how many female and how many male hatchlings are produced as a result of captive breeding: if only one sex is being released, the program will fail. Since this hormonal technique has been successful in every case tried, it could be the factor that saves the "head start" program and the Indian gharial.

> ***"This hormonal technique . . . could be the factor that saves . . . the Indian gharial."***

CRES Grants

Special thanks to the ***Morris Animal Foundation*** *for its two-year grant (1990-1992) to Drs. Oliver Ryder and Karen Garner of the CRES genetics division. The project, an investigation of genetic variation in mountain gorillas, has provided significant new information about the unique evolutionary status of the species. (For more information about this study, see "Inside CRES.")*

Drs. Barbara Durrant and Nancy Pratt of the CRES reproductive physiology division have been awarded a 1992 Conservation Grant by the ***Institute of Museum Services****, a federal agency that offers conservation project support to the nation's museums. The $25,000 matching grant will be applied toward the development of semen cryopreservation techniques for several endangered species.*

CRES 1993 "Wish List"

We need your help . . .

If your holiday spirit includes helping those who help endangered species, please take a moment to consider a holiday equipment gift to CRES. Your gift will make the future brighter for the Earth's vanishing wildlife species.

> ***"To help the animals is our goal, indeed, however, CRES equipment is in need! Whatever you can do to help us this year, we would be most grateful and give a great cheer!"***

Donors who would like to help can contact Amy Parrott in Development at (619) 685-3213, for information about any of the opportunities listed below.

- Video projection unit for behavioral studies, $3,500
- VHS recording desk for behavioral studies, $2,500
- 0.5 gallon, 120V, constant-temperature water bath for various cytogenetics and cell culture procedures, $550
- Nikon photomicroscope accessories for cytogenetics projects, $2,350
- MicroMedic Work Station for radioimmunoassays to quantify hormone levels, $25,000
- Microtiter plate reader to perform enzyme-labeled immunoassays of hormones, $8,000
- Expand computer capacity for DNA mapping, sequencing data analysis, and pedigree records, $3,500
- Baxter Benchtop Centrifuge and accessories for serum collection and chemistry analysis, $6,000
- Olympus BH2 binocular microscope with attachments for pathology examination, $10,000
- 40 x D.I.C. microscope objective lens for visualization and examination of sperm and ova and the observation of *in vitro* fertilization, $1,500
- Single-channel chart recorder for monitoring freezing steps for semen collections, $2,000
- MacVector computer software package for analyzing raw data for sequencing DNA, RNA, nucleic and amino acids, $2,750

Additional giving opportunities:

Postdoctoral Fellow Endowment, $300,000

A naming opportunity that would provide funds for postdoctoral fellow on an annual basis in perpetuity.

CRES Conservator, $25,000

Annual support for the CRES Endowment of $5,000 a year for 5 years.

Chair Endowments, $700,000 and up

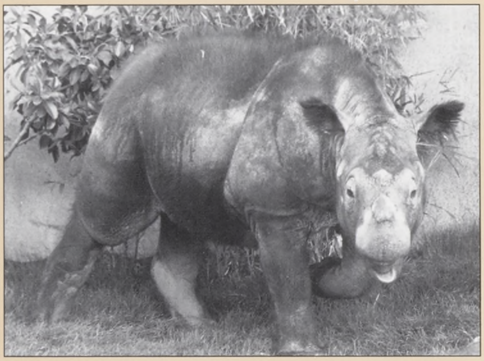
Naming opportunities for individual disciplines that would provide funds for ongoing research in that area on an annual basis in perpetuity.

Thank you, and Happy Holidays from all of us at CRES!

DR. LEE HAGEY

UCSD Chemist Joins CRES Staff

Dr. Lee Hagey, a chemist at the University of California, San Diego (UCSD), has joined the endocrinology division at CRES as a postdoctoral fellow, supported by the ***Joan Irvine Smith and Athalie R. Clarke Foundation****. This position is extremely important in our continued effort to understand rhinoceros ovarian function. As a noninvasive approach to monitor reproduction in the rhino, we measure urinary, fecal, and salivary hormones. Rhinos vary from species to species with respect to the types of hormones excreted. With his chemistry background, Dr. Hagey will provide expertise in identifying these different hormones and will be working with CRES Endocrinology Specialist Nancy Czekala. Monitoring of reproduction is essential for pregnancy detection, identification of the time of delivery, and for timed matings.*



One of our primary goals during Dr. Hagey's tenure on this project is to develop techniques to assess the reproductive status of the endangered Sumatran rhino, of which fewer than 1,000 remain in the wild. We are currently obtaining samples from the four United States zoos holding the Sumatran rhino, as well as some Indonesian zoos. We are also collaborating with scientists currently doing an extensive field survey and fecal sample collections of the wild populations of this species. To discover if reproductive function is altered by captivity, the wild population study will be compared with that of Sumatran rhinos living in zoos. An attempt to make our captive environments as natural as possible may help to produce hormonal patterns in captive rhinos similar to that of free-ranging populations, and may ensure successful reproduction.

Adopt a Deer Fawn!

It's easy and fun to adopt! The animal lover you love is sure to be delighted when they find this unique gift under the tree:

- **A cuddly, plush deer fawn toy of their very own**
- **A handsome adoption certificate**
- **Two complimentary guest passes to the San Diego Zoo or the San Diego Wild Animal Park**
- **A subscription to *CRES Report* (the quarterly publication of the Zoological Society of San Diego's Center for Reproduction of Endangered Species)**
- **A special card to announce your gift adoption.**

And . . . the knowledge that your contribution will help us help the many endangered species at the San Diego Zoo and the San Diego Wild Animal Park.

Why not share a special Holiday Season with someone you love by adopting a deer fawn!

Animal adoptions are a great way to celebrate with your family and friends all year long.

- **Why not ring in the New Year with a ring-tailed lemur!**
- **Give that special someone a Valentine's gift they'll be wild about!**
- **Brighten someone's birthday with a sun bear or a rainbow lorikeet!**

NOTE: Naturally, your adopted deer fawn will remain at the Zoo or the Wild Animal Park in the care of our professional staff. Please be aware that the lives of animals for adoption are subject to unavoidable changes. For that reason, adoptions are offered by species only, not by individual animal.

*Special price good through December 31, 1992.

Share the wonder of the holidays with someone dear by giving them their own plush deer fawn.

ANIMAL ADOPTION APPLICATION

☐ **YES**, I want to adopt a Deer Fawn as a gift for:

Name(s) ______________________________

Address ______________________________

City ____________ State ______ Zip ____________

Please sign the special card announcing my gift adoption as follows:

____

Name(s) ______________________________

Address ______________________________

City ____________ State ______ Zip ____________

Phone (Day) ____________________ Member Number ________

(Evening) ____________________

☐ Also, please enter my own adoption for a Deer Fawn at the special rate of $99 for one year.

Please make checks payable to the Zoological Society of San Diego and mail to:

The Zoological Society of San Diego
Adopt-An-Animal Program
P.O. Box 271
San Diego, CA 92112

Orders must reach the San Diego Zoo by December 12th to ensure delivery by Christmas.

☐ Please check here if you'd like more information about our Adopt-An-Animal Program.

(AHCR2)

HAPPY HOLIDAYS!

'Twas the night
before Christmas,
When all through the Zoo,
Not a creature was stirring,
Not even a gnu.

Each lory and parakeet
was snug in its nest;
Every cat, deer, and frog
was enjoying a rest.
For Christmas, as always—
each day of the year,
All the animals wish you
good tidings and cheer.

And to share all that joy
with your friends far
and near,
With each someone special
that you hold so dear,
Adopt an Animal, or two,
or three. . .
It's the purrfect gift to go
under their tree!

Happy Holidays from Your Friends at the Zoo!

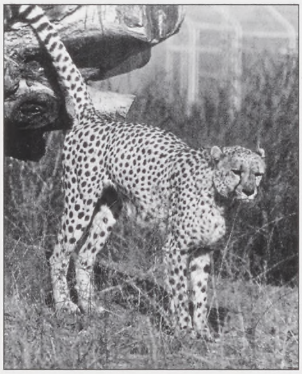
Cheetah Communication

Manetta Cornett, a second-year veterinary student from Auburn University in Alabama, was a summer intern with the behavior division at CRES. Her work was sponsored by the ***Heimple Charitable Foundation*** *and centered on the role of sense of smell in regulating cheetah social interactions. As a summer intern, Manetta made daily observations over a 12-week period at the Wild Animal Park's cheetah breeding facility. This project may provide clues that can predict potential breeding receptiveness in female cheetahs, which have not always reproduced successfully in captivity.*

The cheetah is probably best known for its great speed and hunting skill. We know that the cheetah has exceptional vision and hearing, but little is known about its sense of smell. Recent studies of both wild and captive cheetahs suggest that these cats rely on scent marking as a form of communication.

In the wild, cheetahs have been observed to scent mark objects—most often, elevated places like trees and rocks—with feces or urine. These marks are used to define territorial boundaries, especially for males, and to aid in recognition of individuals. Scraping with the feet or clawing on objects are often associated with the act of scent marking and probably direct attention to the area that has been marked. The sense of smell also appears to be extremely important in conveying information to males about a female's reproductive status.

Although many observations of scent marking have been seen in the wild, controlled situations with captive individuals may help us to understand how the sense of smell is used in sending messages between cheetahs. Under the direction of CRES Behaviorist Dr. Donald Lindburg, 10 cheetahs—5 of each sex—were selected for study during my internship. These animals are part of the CRES breeding and research program at the Wild Animal Park. On each observation day, a cheetah was randomly selected and then introduced into the just-vacated home pen of another cheetah. The various combinations—male into male pens, male into female pens, female into male pens, and female into female pens— were tested.



When introduced into a "new" area (pen), a cheetah's first priority was to investigate it by using the sense of smell. Depending on the information received, a variety of responses—such as urine spraying, defecating, and foot scraping—were seen. The *flehmen* response, a grimacelike facial expression, was also commonly observed, especially in males. The occurrence of the *flehmen* expression in a sexual context suggests that the male cheetah decodes scent information about a female's estrous state.

Researchers have reported seeing a female in the wild mating after spraying bushes, as though she had laid out an "estrous trail" for the male to follow. Since we have previously established that estrus is often silent in this species, female spraying may prove to be a clue that can be used in achieving successful captive breeding of this species.

CRES REPORT
CENTER FOR REPRODUCTION OF ENDANGERED SPECIES

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